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10/809,464	03/26/2004	Hirohito Okuda	500.43701X00	7643

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EXAMINER
PARK, EDWARD

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

	Application No.	Applicant(s)
Office Action Summary	10/809,464	OKUDA ET AL.
	Examiner	Art Unit	
	Edward Park	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on <u>26 November 2007</u>.

2a) ☒ This action is **FINAL**.   2b) ☐ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) <u>1-6 and 26-29</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) <u>1-6 and 26-29</u> is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☒ The specification is objected to by the Examiner.

10) ☒ The drawing(s) filed on <u>26 November 2007</u> is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a) ☐ All   b) ☐ Some *   c) ☒ None of:

      1. ☒ Certified copies of the priority documents have been received.

      2. ☐ Certified copies of the priority documents have been received in Application No. _____.

      3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1.   This action is responsive to applicant's amendment and remarks received on 11/26/07.

Claims 1-6, 26-29 are currently pending.

Priority

2.   Acknowledgment is made of applicant's claim for foreign priority based on an application

filed in Japan on March 28, 2003. It is noted, however, that applicant has not filed a certified

copy of the Japanese application as required by 35 U.S.C. 119(b).

Drawings

3.   In response to applicant's amendment of the drawings, the previous drawing objections

are withdrawn.

Specification

4.   The title of the invention is not descriptive. A new title is required that is clearly

indicative of the invention to which the claims are directed.

Claim Objections - 37 CFR 1.75(a)

5.   In response to applicant's amendment of claims 1, 3, 4, 5, 6, the previous claim

objections are withdrawn.

In response to applicant's cancellation of claims 7, 10, 11, 14, 15, 16, 20, 21, 25, the

previous claim objections are withdrawn.

Claim Rejections - 35 USC § 102

6.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the

basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7.   **Claims 1, 4, 5, 26, 27** are rejected under 35 U.S.C. 102(b) as being anticipated by Ko et

al (IEEE, "Solder Joints Inspection Using a Neural Network and Fuzzy Rule-Based

Classification Method").

Regarding **claim 1**, Ko discloses a method for classifying defects, comprising:

obtaining an image of a defect on a sample ("three-color tiered illumination system ... CCD

camera"; Ko: pg. 94, right column, last paragraph);

extracting a characteristic of the defect from the image ("classify solder joints by color patterns obtained from a three-tiered color circular illumination system based upon a similarity measure between input data and the feature vectors of each class"; Ko: pg. 94, left column, third paragraph);

classifying the defect in accordance with the extracted characteristic, and based on a rule-based classification classifying the defect in accordance with the extracted characteristic and based on a rule-based classification and a learning type classification (see pg. 94, left column, first paragraph);

calculating a set of first likelihoods of the defect belonging to each of a plurality of defect classes of the rule-based classification, by use of the extracted characteristic (see pg. 94, left column, first paragraph, unsupervised self organizing neural network such as either a learning vector quantization (LVQ) neural network which is inherently rule-based since no classification algorithm can not operate or execute without rule-based);

calculating a set of second likelihoods of the defect belonging to each of a plurality of defect classes of the learning type classification, by use of the extracted characteristic (see pg. 94, left column, first paragraph, adaptive learning mechanism can automatically select the optimal number of clusters during a learning procedure);

calculating a third set of likelihoods of the defect belonging to each of the defect classes of the learning type classification, by use of the first and second likelihoods (see pg. 94, left column, first paragraph, after the learning procedure, a supervised learning method can then readjust the boundaries of classes like the supervised vector quantization algorithm); and

classifying the defect by use of the third likelihoods (see pg. 94, left column, first paragraph, able

to readjust class boundaries with prior knowledge in the classification procedure).

Regarding **claim 4**, Ko discloses wherein the plurality of classes of the rule-based

classification are selected from class sets (Ko: pg. 94, left column, first paragraph) displayed on a

display screen (Ko: pg. 94, right column, last paragraph).

Regarding **claim 5**, Ko discloses the third likelihoods are calculated of by using a

classification model comprising a relation of the classes of the learning type classification and

the classes of the rule-based classification (see pg. 94, left column, first paragraph).

Regarding **claim 26**, Ko discloses an apparatus for classifying defects, comprising:

imaging means for obtaining an image of a defect on a sample ("three-color tiered illumination

system ... CCD camera"; Ko: pg. 94, right column, last paragraph);

means for extracting a characteristic of the defect from the image ("classify solder joints by color

patterns obtained from a three-tiered color circular illumination system based upon a similarity

measure between input data and the feature vectors of each class"; Ko: pg. 94, left column, third

paragraph);

means for classifying the defect in accordance with the extracted characteristic, and based on a

rule-based classification and a learning type classification (see pg. 94, left column, first

paragraph), and

a display for displaying the image of the defect and the classification result on a screen (see pg.

94, right column, last paragraph);

wherein said classifying means comprises;

a rule-based classification apparatus for calculating a likelihoods of the defect belonging to each

of plurality of rule classes by use of the characteristics of the defect (see pg. 94, left column, first

paragraph, unsupervised self organizing neural network such as either a learning vector

quantization (LVQ) neural network which is inherently rule-based since no classification

algorithm can not operate or execute without rule-based),

a learning type classification apparatus for calculating a set of second likelihoods of the defect

belonging to each of a plurality of defect classes by use of the characteristic of the defect (see pg.

94, left column, first paragraph, adaptive learning mechanism can automatically select the

optimal number of clusters during a learning procedure), and

a classification model for calculating a set of third likelihoods of the defect belonging to each of

said defect classes, by use of the first and second likelihoods (see pg. 94, left column, first

paragraph, after the learning procedure, a supervised learning method can then readjust the

boundaries of classes like the supervised vector quantization algorithm).

Regarding **claim 27**, Ko discloses displaying a plurality of class sets on the screen, for

selection of said rule classes (see pg. 94, right column, last paragraph; left column, first

paragraph).

Claim Rejections - 35 USC § 103

8.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or
> described as set forth in section 102 of this title, if the differences between the subject
> matter sought to be patented and the prior art are such that the subject matter as a whole

would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9.   **Claim 2** is rejected under 35 U.S.C. 103(a) as being unpatentable over Ko et al (IEEE, "Solder Joints Inspection Using a Neural Network and Fuzzy Rule-Based Classification Method") in view of Henry et al (IEEE/SEMI, "Application of ADC Techniques to Characterize Yield-Limiting Defects Identified with the Overlay E-test/Inspection Data on Short Loop Process Testers).

Regarding **claim 2**, Ko discloses all elements as mentioned above in claim 1. Ko does not disclose wherein the image is an SEM image.

Henry, in the same field of endeavor, teaches wherein the image is an SEM image ("SEM images"; Henry: section 3, first paragraph)

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Ko reference to utilize an SEM image as taught by Henry, to allow for more detailed, enhanced images which would enhance the detection and classification of defects.

10.   **Claim 3** is rejected under 35 U.S.C. 103(a) as being unpatentable over Ko et al (IEEE, "Solder Joints Inspection Using a Neural Network and Fuzzy Rule-Based Classification Method") in view of Kikuchi et al (US 6,801,650 B1)

Regarding **claim 3**, Ko discloses all elements as mentioned above in claim 1. Ko does not disclose defect image is obtained while the sample is positioned in accordance with position coordinate data of the defects on the sample.

Kikuchi, in the same field of endeavor, teaches defect image is obtained while the sample is positioned in accordance with position coordinate data of the defects on the sample. ("defective position coordinate ... positions of defects on the semiconductor wafer"; Kikuchi: col. 17, lines 41-54).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Ko reference to utilize position coordinate data of the defects on the sample as taught by Kikuchi, to allow the "area of the semiconductor wafer under inspection [to be] in the field of view of the objective lens" (Kikuchi: col. 17, lines 41-54).

11.   **Claims 6, 28, 29** are rejected under 35 U.S.C. 103(a) as being unpatentable over Ko et al (IEEE, "Solder Joints Inspection Using a Neural Network and Fuzzy Rule-Based Classification Method") in view of Xu et al (IEEE, Methods of Combining Multiple Classifiers and Their Applications to Handwriting Recognition)

Regarding **claim 6**, Ko discloses all elements as mentioned above in claim 5. Ko does not disclose generating a plurality of classification models; determining a likelihood of the adequacy of each classification model; and deciding a class likelihood according to the determined model likelihood.

Xu, in the same field of endeavor, teaches a plurality of classification models; determining a likelihood of the adequacy of each classification model; and deciding a class likelihood according to the determined model likelihood (Xu: page 421, left column, lines 20-40).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Ko reference to calculate the likelihood of each classification class as taught by Xu, to improve the performance and reliability of individual classifiers.

Regarding **claims 28, 29**, Ko discloses all elements as mentioned above in claim 26. Ko does not disclose a computing section for calculating a likelihood of the adequacy of each of a plurality of classification models and classifies the defects by using said likelihood of the adequacy of the classification models; a computing section for calculating said third likelihood and a model likelihood of the adequacy of the individual classification models to decide a class likelihood according to the model likelihood.

Xu, in the same field of endeavor, teaches a computing section for calculating a likelihood of the adequacy of each of a plurality of classification models and classifies the defects by using said likelihood of the adequacy of the classification models; a computing section for calculating said third likelihood and a model likelihood of the adequacy of the individual classification models to decide a class likelihood according to the model likelihood (Xu: page 421, left column, lines 20-40).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Ko reference to calculate the likelihood of each classification class as taught by Xu, to improve the performance and reliability of individual classifiers.

Response to Arguments

12.   Applicant's arguments filed 11/26/07, in regards to **claim 1** have been fully considered but they are not persuasive. Applicant argues that the Ko reference does not disclose the

limitations of the original claims filed on 3/26/04. This argument is not considered persuasive

since the applicant has amended claim 1 and therefore has brought in new limitations changing

the scope of the claim, and these new limitations obviously were not addressed in the previous

office action. Furthermore, applicant argues that the Ko reference in the previous office action

does not meet the new limitations of claim 1. This argument is not considered persuasive and the

rejection of claim 1 can be seen above.

Regarding **claims 2-6**, applicant argues that the prior art does not meet the limitations of

the claims due to claims 2-6 being dependent on claim 1. This argument is not considered

persuasive since claim 1 is rejected and the rejection of claims 2-6 can be seen above.

Regarding **claim 26**, applicant argues that since the claim performs the steps recited in

independent claim 1, it is considered allowable subject matter. This argument is not considered

persuasive since the claim limitations of claim 1 are met and can be seen above.

Regarding **claims 27-29**, applicant argues that the prior art does not meet the limitations

of the claims due to claims 27-29 being dependent on claim 26. This argument is not considered

persuasive since claim 26 is rejected and the rejection of claims 27-29 can be seen above.

Conclusion

13.   **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time

policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE

MONTHS from the mailing date of this action. In the event a first reply is filed within TWO

MONTHS of the mailing date of this final action and the advisory action is not mailed until after

the end of the THREE-MONTH shortened statutory period, then the shortened statutory period

will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the mailing

date of this final action.

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Edward Park whose telephone number is (571) 270-1576. The

examiner can normally be reached on M-F 10:30 - 20:00, (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Vikkram Bali can be reached on (571) 272-7415. The fax phone number for the

organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent

Application Information Retrieval (PAIR) system. Status information for published applications

may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

applications is available through Private PAIR only. For more information about the PAIR

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information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Edward Park
Examiner
Art Unit 2624

/Edward Park/

VIKKRAM BALI
PRIMARY EXAMINER